

Chapter 3

Assessing the Performance of Decision Support Systems in Military Environment: The 3C Method

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ABSTRACT

This article explores the ability of a decision support system (DSS) to improve the quality of decision making in extreme environment. This DSS is actually based on a networked information system. Academic literature commonly mentions models of fit to explore the relationship between technology and performance, reckoning users' evaluations as a relevant measurement technique for Information System (IS) success. Although effective contributions have been achieved in measurement and exploration of fit, there have been few attempts to investigate the triangulation of fit between "Task-DSS-Decision Maker" under stressful and uncertain circumstances. This article provides new insights regarding the advantages provided by networked IS for making relevant decisions. An original case study has been conducted. It is focused on a networked decision support system called Link 16 that is used during aerial missions. This case study shows that the system improves decision making on an individual basis. Our result suggest the importance of three main fit criteria – Compliance, Complementarity and Conformity – to measure DSS performance under extreme environment and display a preliminary decisional fit model.

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INTRODUCTION

At the time of writing, French fighter pilots are deployed in Central African Republic, Mali and Iraq to perform risky missions. As the mass media often reminds us, such air operations are quite dangerous and pilots have to make decisions under risky and stressful conditions. To achieve their goals, some of them are equipped with a specific decision support system, called Link 16. It is a tactical data exchange network which specification is part of the family of Tactical Data Links. With Link 16, users exchange their data and tactical picture in near real time.

This article explores the capacity of a decision support system (DSS) based upon a networked Information System (IS) to improve the quality of decision making (J. F. Lebraty & Godé-Sanchez, 2010). More precisely, the research question can be stated as follows: How does a decision support system based upon a networked information system contribute to improve performance of individual decision making in extreme environment? To address our research question, we based our analysis on the “utilization-focus” stream which aims at examining users’ attitudes and perception to measure the way technology affects performance in organizations (Thompson, Higgins, & Howell, 1991). Drawing on such a research stream, some contributions argue that performance impact can be evaluated in investigating task-technology fit, that is when “*a technology provides features and support that “fit” the requirement of the task*” (Goodhue, 1995, p. 214). Models of fit commonly reckon users’ evaluations as a relevant measurement technique for information system success (Goodhue, Klein, & March, 2000). Indeed, objective measures – trough metrics – of IS performance are particularly complex to achieve and users’ evaluations are considered as an appropriate surrogate (Gelderman, 2002).

Although significant contributions have been achieved in exploration of task-technology fit and measurement of fitness, there have been few published attempts to investigate the trade-off in fitness between “Task-DSS-Decision Maker”. Instead, literature chiefly prioritizes the unique task and DSS relationship over the triangulation (Zigurs & Khazanchi, 2008). This article intends to investigate both the relationships between task-DSS and DSS-decision makers in order to provide some new and valuable insights to assess the performance of decision support system based upon a networked IS. We build our analysis from extreme situations, suggesting that when individual decisions are made in such circumstances, the systems’ ability to provide decision makers with an appropriate representation of the problem becomes central. Moreover, due to paroxysmal effects, we consider that exploring the way people exploit network information systems to ultimately make decisions in extreme situations allows revealing some specific usages and improvements that could be much more difficult to examine in classical work situations.

This article explores users’ evaluations of decision quality when they use a networked IS, in comparison with decision quality without using such a system. Such a benchmarking design is built on a qualitative study funded by the French Ministry of Defense, which especially highlighted the issue of acquiring new capabilities with regards to the multi-role fighter aircraft Rafale outfitted with the Link 16 system. It has been the opportunity to collect pilots and navigators’ perceptions on decision making performance with or without this networked system.

This article proceeds as follows. First, we review prior literature on fit models and delineates the notions of DSS based upon a networked IS and extreme situations. Then, we present our method and depict our case study. We discuss the case findings and display three new criteria to advance understanding of fitness. Finally we conclude in highlighting some theoretical and managerial implications of our analysis.

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